

REMARKS/ARGUMENTS

Claims 33-48 are pending in this application. In the present response, claims 33, 36, 38, 42 and 44 have been amended in order to more clearly recite applicant's invention. Claims 34, 35, 37 and 47 are canceled without prejudice or disclaimer. Additionally, new claims 49-53 are proposed for addition to the application. The claim amendments and new claims are all entirely supported by the application as originally filed and thus there is no issue of new matter. Upon entry of this Amendment, claims 33, 36, 38-46 and 48-53 will be pending in the application.

Claim Rejections Under 35 U.S.C. §112

Claims 36 and 42 are rejected under 35 U.S.C. §112, second paragraph as being allegedly indefinite for the reasons set forth in ¶ 3-4 on pp. 2-3 of the Office Action. In response, the claims have been amended (see above) in a manner which is believed to overcome the rejections under §112. Additionally, new claim 49 proposed for entry herein contains some of the matter canceled from claim 36 and new claims 50-52 now recite the matter canceled from claim 42. Entry of these new claims into the file of the application is respectfully solicited.

The Examiner is requested to reconsider and to withdraw the rejections under 35 U.S.C. §112.

Claim Rejections Based on 35 U.S.C. §§102/103

Claims 33, 34, 35, 37, 38, 40 and 47 are rejected under 35 U.S.C. §103 over U.K. Patent No. 1,567,773 to Welwyn Hall Research Associates ("Welwyn"). The cancellation above of claims 34, 35, 37 and 47, without prejudice or disclaimer, renders the rejection moot as to those claims. However, the rejection of claims 33, 38 and 40 survives and is traversed herein.

Claim 33 is an independent claim, whereas claims 38 and 40 depend (directly or indirectly) from claim 33. The dependent claims thus include all of the features recited in the independent claim.

Claim 33 has been amended to more clearly recite applicant's invention and to further distinguish the method recited therein from the prior art cited in the Office Action. The subject claim now recites a method of treating waste matter from animals comprising:

a) collecting waste matter from the animals; b) reversibly inhibiting urease activity in the collected waste matter; and c) separating said urease-activity inhibited waste matter into a urea-rich fraction essentially consisting of a liquid comprising urea and other components soluble in liquid manure and a urea-lean fraction; wherein said reversible inhibition comprises treating the collected waste matter by a method including at least one step selected from the group consisting of decreasing pH, buffering pH, at least one of decreasing and increasing pressure, at least one of decreasing and increasing ionic strength and combinations thereof.

Claim 33, as now amended, therefore, requires that the inhibition of the urease be reversible. In contrast, Welwyn is only concerned with irreversible inhibition of urease activity in animal waste. The Examiner states (Office Action, p. 5) that, "lime treatment is irreversible because raising the pH to at least 11 is sufficient to denature the urease enzyme". The Office Action, however, goes on to state that (with reference to Welwyn, p. 3, lines 94-100), "temperature is a result effective variable which controls the rate of urea decomposition in the presence of urease". This latter comment, though, appears to be a reflection of the well-known Arrhenius equation regarding the correlation between chemical reaction rates and temperature, i.e. that chemical reactions proceed faster at higher temperatures. This correlation also applies to enzymatic reactions to some extent although the activity-temperature profile of an enzyme will typically be more complex showing an actual temperature optimum. However, claim 33 has been amended to exclude mention of causing inhibition by changing the temperature.

Furthermore, where Welwyn is aware that a high temperature may further the urease mediated decomposition of urea into ammonia and carbon dioxide, the only suggestion contained in the reference with regard to inhibiting the urease is by increasing pH (to above 9), thereby denaturing the enzyme. Welwyn does not indicate that lowering the pH, buffering the pH, increasing or decreasing pressure or ionic strength, such as are now recited in claim 33 as amended, will have any inhibitory effect on the enzyme. In light of the secondary objective of Welwyn, which is the effective destruction of pathogens (see, e.g., p. 1, lines 30-32), it can be said that Welwyn teaches away from such applicant's method of solution as recited in claim 33, since these measures cannot be expected to sufficiently destroy pathogens.

In other words, Welwyn is not suggesting any advantages of exposing the animal waste to conditions to reversibly inhibit the urease present in the waste, nor does the reference present any indications as to how a reversible inhibition may be obtained. For these reasons, therefore, the method recited in present claim 33 is believed to be unobvious over Welwyn and the

Examiner is respectfully requested to reconsider and withdraw the rejection of the subject claim based on the reference. Furthermore, since as noted above claims 38 and 40 are dependent upon claim 33 and thus include all of the recitations contained in that claim, those claims are deemed by applicant to be distinguishable for the same reasons as independent claim 33.

Further to the above, claims 36 and 39 are rejected under 35 U.S.C. §103 on p. 6 of the Office Action over Welwyn taken in view of U.S. Patent No. 3,644,442 to Wilson et al. (“Wilson”) for the reasons set forth in ¶¶ 20-21 of the Office Action. The rejection is respectfully traversed.

Claims 36 and 39 are dependent claims that depend from claim 33. As such, these rejected claims include all of the recitations found in the independent claim. For the reasons presented above, applicant deems that claim 33 as now amended is distinguishable from Welwyn. Moreover, the combination of Wilson with Welwyn brings one no closer to the invention recited in claims 36/33 and 39/36/33 since Wilson fails to supply the elements of the invention missing from Welwyn. That is, the Wilson reference is added due to its teaching to use EDTA and hydroxamic acid as urease inhibitors and does not supply the element(s) of the method recited in claim 33 missing from the Welwyn reference.

As discussed above Welwyn does not disclose a method to reversibly inhibit urease activity. In the present invention it is important (as expressed at p. 21, lines 11-12) that the duration of the urease inhibition can be controlled. Applicant respectfully disagrees that the aspects of Welwyn cited to by the Examiner in the present Office Action describe or even suggest a system where the duration of a putative reversible inhibition may be controlled.

Regarding the ‘contribution’ of the secondary Wilson reference, Wilson employs hydroxamic acid and EDTA as feed additives for ruminants in order to increase the amount of protein produced from urea by microorganisms in the rumen of animals fed the additives. Hydroxamic acids and EDTA are not, however, included in the group of irreversible inhibitors recited in claim 36 as amended. Thus, a combination of the teachings of Welwyn and Wilson cannot lead to the present invention since the irreversible inhibitors presented in claim 36 are not disclosed by Wilson.

For the reasons above, therefore, applicant submits that claim 36 is distinguishable, and thus not obvious, over the cited combination of references. Furthermore, as claim 39 depends from claim 36, the subject claim is also believed to be distinguishable for the same reasons as

claim 36. The Examiner is, thus, respectfully requested to reconsider and withdraw the rejections of claims 36 and 39 under 35 U.S.C. §103.

Claims 41-44 and 48 are rejected under 35 U.S.C. §102(b) as allegedly anticipated by or, in the alternative, under 35 U.S.C. §103 as obvious over, the Welwyn reference. The rejection is respectfully traversed.

In response to the Examiner's rejection, applicant respectfully emphasizes that the product of claim 41 is produced according to the method of claim 33. Further, the product must exhibit "a reversible inhibition of urease catalytic activity". As argued above the temperature induced limitation in the reaction rate of the urease enzyme as described by Welwyn cannot be considered a reversible inhibition. For the product of claim 41 this is particularly important, as control of the temperature of the product will largely be dependent on external factors. In contrast, the method of the present invention (used to form the product) allows production of a urease inhibited product which is not dependent on external factors, i.e., when the pH is buffered to the value for the isoelectric point of the urease (see p. 19, lines 9-11), the inhibition will be generally independent of such external parameters as temperature control.

Claims 42-44 and 48 recite specific embodiments of the product of claim 41. These claims all depend, directly or indirectly upon claim 41 and, thus, they contain all of the features recited in that independent claim. Still further, claim 41 depends, in turn, from claim 33 which is distinguished above over the Welwyn reference. With regard to the dependent claims, moreover, applicant notes that the Examiner comments upon the requirements presented in claims 43 and 48 with the statement that the, "urea-rich fraction exhibits minor residues of irreversibly urease-activity inhibitors". This feature, however, must be understood in the context of "reversible inhibition" as defined p. 30, lines 27-29, i.e., that the concentration of the minor residues are insufficient to irreversibly inhibit the enzyme.

For the reasons above, claims 41-44 and 48 are submitted as being both novel and non-obvious over Welwyn. The Examiner is, therefore, respectfully requested to reconsider and withdraw the rejection of the subject claims under §§102/103.

Still further, claims 45 and 46 are rejected under 35 U.S.C. §103 as allegedly 'obvious' over Welwyn in view of U.S. Patent No. 4,349,572 to Larson et al. ("Larson"). This rejection is respectfully traversed.

Claim 45 is an independent claim that is directed to a method of producing urea-formaldehyde from waste matter of animals. According to the claim, the method comprises: a) producing a urea-rich fraction of the waste matter from the animals by a method comprising:

- i) collecting waste matter from the animals;
- ii) inhibiting urease activity in the collected waste matter; and
- iii) separating the urease-activity inhibited waste matter into a urea-rich fraction essentially consisting of a liquid comprising urea and other components soluble in liquid manure and a urea-lean fraction; the inhibition comprising reversible inhibiting urease activity of the collected waste matter before the separation of the urease-activity inhibited waste matter into said urea-rich fraction and said urea-lean fraction; and b) reacting the urea-rich fraction with methanal.

Claim 46 depends from claim 45 and further defines the subject matter recited in that claim. As a dependent claim, however, it contains all of the recitations found in 'parent' claim 45.

In response to the rejection applicant notes that as taught in the present application at p. 12, lines 27-28 and p. 13, lines 16-30, the urea-formaldehyde produced (i.e., via the method of claim 45) is a (thermosetting) polymer which may be used as, e.g., a wood binder. In this regard, the Examiner is correct in stating (see, e.g., ¶27 on p. 9 of the Office Action) that "Larson teaches that contacting the excreta with formaldehyde destroys pathogenic faecal microbes and prevents mold growth". However, the teaching contained in Larson neither discloses nor suggests making a thermosetting polymer.

The product described by Larson, in fact, has no relation to a polymer material, and claim 1 of Larson, in contrast, requires a product "having acceptable aesthetic and organoleptic properties". In light of these desired aesthetic and organoleptic properties an actual polymerization may be considered as being undesirable since polymerization would not be likely to improve the organoleptic properties.

Larson further states (see col. 5, lines 27-31) that, "As an incidental benefit, the treatment of the waste material with aldehydes reduces the rate of ammonia release from non-protein nitrogen material, such as, urea, in the waste and thereby reduces the chance of ammonia toxicity in the animals". This aspect is summarized in claim 1 of the reference as an intention, "to completely neutralize substantially all free ammonia and amine of said excreta". This merely

shows that Larson is aware that ammonia will be formed from urea, and that ammonia is considered detrimental to the aesthetic properties of the resulting product. In other words, Larson intends to prevent formation of ammonia, and therefore it is intended (as recited in claim 1), "to react said excreta substantially immediately with said liquid aldehyde".

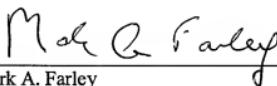
The method of producing urea-formaldehyde according to the present invention, i.e., as recited in claim 45, differs from that of Larson in that the claimed method requires separation of the urease inhibited animal waste into "a urea-rich fraction essentially consisting of a liquid comprising urea" prior to reacting this liquid urea-rich fraction with methanal (formaldehyde).

In conclusion therefore, it is respectfully submitted that the teaching of Larson cannot be combined with the urease inhibition method of Welwyn to arrive at the method of the claim 45 of the present invention. Where Welwyn separates a liquid from a solid fraction following inhibition of urease, Larson adds aldehyde immediately to the animal waste. Larson has no interest in polymerization of the material. Instead, the reference displays an interest in sequestering ammonia and potential sources for ammonia. Both these facts serve as a teaching away from the method of claim 45. The subject claim is thus believed to be distinguishable over the combination of Welwyn and Larson and the rejection under 35 U.S.C. §103 thus should be withdrawn.

Furthermore, as indicated above, claim 46 represents a specific embodiment of the method of claim 45 and contains all of the features recited in the subject claim. Claim 46 is, therefore, believed to be distinguishable for the same reasons as claim 45. The Examiner thus is respectfully requested to also reconsider and withdraw the rejection of claim 46.

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